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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/656,660	09/05/2003	Satoru Mizouchi	1232-4810US1	8294

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EXAMINER	
SPECTOR, DAVID N	
ART UNIT	PAPER NUMBER
2873	

DATE MAILED: 02/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/656,660	MIZOUCHI, SATORU	
	Examiner	Art Unit	
	David N. Spector	2873	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 September 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10,12,14,15,17 and 18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1-10,12,14,15 17, and 18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on *04 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 10/053,191.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *DETAILED ACTION*.

DETAILED ACTION – FINAL REJECTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. **Claims 1-7, 14 and 17 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Tanitsu et al (US 5,636,003) in view Kudo et al. (US 4,918,583).**

Regarding claims 1 and 14, Tanitsu discloses a illumination optical system (see FIG. 33; col. 1, lines 13-17; and col. 2) used in exposure apparatus for fabrication of semiconductors which illuminates a reticle with a circuit pattern in plane wherein an optical system projects the pattern onto a wafer. Tanitsu discloses several embodiments of the system comprising two integrators (for example FIG. 33) comprising a first integrator (142; fly eye lens); an optical system for directing a beam form a light source to be incident on the first integrator (beam shaper, 115, 116); a wave front splitting integrator (162; fly eye lens; col. 21, lines 35-50); an image forming optical system (156, 157; col. 21,lines 35-40 and 55-60; col. 6, lines 24-30) for arranging the portion of incidence of the first optical integrator (F_{42}) and approximately conjugate with the wave front splitting type integrator (F_{43}) and for directing a beam from the first optical integrator to the wave front splitting type integrator(162; col. 21, lines 50-60); and an irradiating optical system (178, 179) for superimposing multiple beams from the wave front splitting integrator (162) on a plane to be irradiated (see col. 21,lines 65-67); and wherein a stop(155; col. 21,lines 50-55) is provide at the exit of the first optical integrator. Furthermore, in various embodiments, Tanitsu implements the illumination optical system with two inner surface reflection type integrators (for example see FIG. 14); however, Tanitsu fails to specifically disclose one of the two optical integrators in a two-integrator system is an

inner-surface reflecting type integrator as claimed. In the same field of endeavor, Kudo discloses an illumination device suitable for an exposure apparatus for manufacturing a semiconductor chip (col. 1) where the system is constructed to provide a inner surface reflecting type integrator and fly eye lens integrator in a two integrator system (for example see FIG. 1). Kudo designs this system to solve the problem of the lens being damage over time from the use of a high out light source, such a laser and provide uniform illumination (see col. 2,lines 1-10). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the illumination system of Tanitsu with a integrators system with a inner reflector type and fly eye type as disclosed by Kudo, to provide a system which helps to provide even illumination in an exposure (stepper) equal to a system with a plurality of fly eye lens integrators and having simple construction.

Regarding claim 2, Tanitsu discloses a system with inner-surface reflection type integrator where the rectangular cross section are used to reflect the parallel beams from the light source to an output exit side of the integrator (see col. 15) for forming a surface light source.

Regarding claim 3, Tanitsu discloses and the wave front splitting integrator is a fly eye lens. As illustrated in FIG. 33, the fly eye lens (162) is a lens array. The lens array forms multiple secondary light sources on the portion (see col. 21, lines 56-65).

Regarding claim 4, Tanitsu discloses the stop (155) is a mechanical aperture (see FIG. 33).

Regarding claim 5, Tanitsu and Kudo fail to disclose an embodiment where the stop is integrally formed to the exit surface of the reflection type integrator with a light shield material. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a stop integral with reflection type integrator, since it has been held that forming one piece an article which has formerly been formed in two pieces and put together involves only routine skill in the art. *Howard v. Detroit Stove Works, 150 USPQ 164 (1893).*

Regarding claims 6 and 7, Tanitsu and Kudo fail to disclose an embodiment where the stop is integrally formed to the exit surface of the reflection type integrator with a multi-layer film or metallic film vapor deposited. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a stop integral with reflection type integrator, since it has been held that forming one piece an article which has formerly been formed in two pieces and put together involves only routine skill in the art. *Howard v. Detroit Stove Works, 150 USPQ 164 (1893).* Furthermore, claims 6 and 7 recite the "films are vapor deposited"; and note that a "product by process" claim is directed to the product per se, no matter how actually made. See *In re Thorpe et al, 227 USPQ 964 (CAFC, 1985)* and the related case law cited therein which makes it clear that it is the final product per se which must be determined in a product by process claim, and not the patentability of the process.

Regarding claim 17, Tanitsu discloses a illumination optical system (col. 1, lines 13-17 and col. 2) used in exposure apparatus for fabrication of semiconductors which illuminates a reticle with a circuit pattern in plane wherein an optical system projects the pattern onto a wafer for creating a semiconductor. Tanitsu discloses several embodiments of the system comprising two integrators, for example FIG. 33, comprising a first integrator (142; fly eye lens); an optical system for directing a beam form a light source to be incident on the first integrator (beam shaper, 115,116); a wave front splitting integrator (162; fly eye lens; col. 21, lines 35-50); an image forming optical system (156,157; col. 21,lines 35-40 and 55-60; col. 6, lines 24-30) for arranging the portion of incidence of the first optical integrator (F_{42}) and approximately conjugate with the wave front splitting type integrator (F_{43}) and for directing a beam from the first optical integrator to the wave front splitting type integrator(162; col. 21, lines 50-60); and an irradiating optical system (178,179) for superimposing multiple beams from the wave front splitting integrator (162) on a plane to be irradiated (see col. 21, lines 65-67); and wherein a stop(155; col. 21,lines 50-55) is provided at the exit of the first optical integrator. Furthermore, in various embodiments, Tanitsu implements the illumination optical system with two inner surface reflection type integrators (for example see FIG. 14); however, Tanitsu fails to specifically disclose one of the two optical integrators in a two-integrator

system is an inner-surface reflecting type integrator as claimed. In the same field of endeavor, Kudo discloses an illumination device suitable for an exposure apparatus for manufacturing a semiconductor chip (col. 1) where the system is constructed to provide a inner surface reflecting type integrator and fly eye lens integrator in a two integrator system (for example see FIG. 1). Kudo designs this system to solve the problem of the lens being damage over time from the use of a high out light source, such a laser and provide uniform illumination (see col. 2, lines 1-10). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Tanitsu to include one of the two optical integrators in a two-integrator system as an inner-surface reflecting type integrator as taught by Kudo, to provide a system which helps to provide even illumination in an exposure (stepper) equal to a system with a plurality of fly eye lens integrators and having simple construction.

3. **Claims 8-10, 12,15 and 18 are rejected under 35 U. S. C. 103 (a) as being unpatentable over Tanitsu et al (US 5,636,003) in view of Kudo et al. (US 4,918,583), and further in view of applicants admitted prior art.**

Regarding claim 8, as applied to any one of claims 1-7 above, Tanitsu discloses the image forming system is a relay lens system (156,157). Tanitsu and Kudo fail to disclose an embodiment where the image-forming lens is a zoom lens. In the same field of endeavor, applicant's admitted prior art using a two integrator system of a inner-surface reflecting type integrator and fly eye lens that incorporates a zoom lens for the image forming system (see FIG. 5, #7; page 3, lines 10-17). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the illumination system taught by Tanitsu and Kudo with a zoom lens as the image forming lens, as taught by applicants admitted prior art, to provide an illumination system which can continuously change the coherence of the light beams.

Regarding claims 9 and 10, Tanitsu discloses design inner surface reflection integrators with square or rectangular cross sections. And Tanitsu has an aperture having a circular aperture (see col. 21, lines 52-55) and thus has an aperture for correcting anisotropy.

Regarding claim 12, Tanitsu discloses a illumination optical system (col. 1, lines 13-17 and col. 2) used in exposure apparatus for fabrication of semiconductors which illuminates a reticle with a circuit pattern in plane wherein an optical system projects the pattern onto a wafer. Tanitsu discloses several embodiments of the system comprising two integrators, for example FIG. 33, comprising a first integrator (142; fly eye lens); a wave front splitting integrator (162; fly eye lens; col. 21, lines 35-50); an image forming optical system (156,157; col. 21,lines 35-40 and 55-60; col. 6, lines 24-30) for projecting an image of the portion of exit from the first integrator to the wave front splitting type integrator (162; col. 21, lines 50-60); and an irradiating optical system (178,179) for superimposing multiple beams from the wave front splitting integrator (162) on a plane to be irradiated (see col. 21,lines 65-67); and wherein a stop(155; col. 21,lines 50-55) is provide at the exit of the first optical integrator. Tanitsu has an aperture stop having a circular aperture (see col. 21, lines 52-55).

Furthermore, in various embodiments, Tanitsu implements the illumination optical system with two inner surface reflection type integrators (for example see FIG. 14), which are square or rectangular (n-gonal); however, Tanitsu fails to specifically disclose one of the two optical integrators in a two-integrator system is an inner-surface reflecting type integrator and the imaging forming optical system is a zoom optical system as claimed. In the same field of endeavor, Kudo discloses an illumination device suitable for an exposure apparatus for manufacturing a semiconductor chip (col. 1) where the system is constructed to provide a inner surface square shaped reflecting type integrator and fly eye lens integrator in a two integrator system (for example see FIG. 1). Kudo designs this system to solve the problem of the lens being damage over time from the use of a high out light source, such a laser and provide uniform illumination (see col. 2,lines 1-10).

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Tanitsu to include one of the two optical integrators in a two-integrator system as an inner-surface square shape reflecting type integrator in dual integrator system as taught by Kudo, to provide a system which helps to provide even illumination in an exposure (stepper) equal to a system with a plurality of fly eye lens in-

tegrators and having simple construction. In addition, Tanitsu and Kudo fail to specifically disclose an embodiment where the image-forming lens is a zoom lens. In the same field of endeavor, the applicants admitted prior art using a two integrator system of a inner-surface reflecting type integrator and fly eye lens incorporates a zoom lens for the image forming system (see FIG. 5, #7; page 3, lines 10-17). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Tanitsu and Kudo to provide a zoom lens as an image forming lens, as taught by applicants admitted prior art, to provide an illumination system which can continuously change the coherence of the light beams.

Regarding claim 15, Tanitsu discloses a illumination optical system (col. 1, lines 13-17 and col. 2) used in exposure apparatus for fabrication of semiconductors which illuminates a reticle with a circuit pattern in plane wherein an optical system projects the pattern onto a wafer. Tanitsu discloses several embodiments of the system comprising two integrators, for example FIG. 33, comprising a first integrator (142; fly eye lens); a wave front splitting integrator (162; fly eye lens; col. 21, lines 35-50); an image forming optical system (156,157; col. 21,lines 35-40 and 55-60; col. 6, lines 24-30) for projecting an image from the first integrator to the wave front splitting type integrator (162; col. 21, lines 50-60); and an irradiating optical system (178,179) for superimposing multiple beams from the wave front splitting integrator (162) on a plane to be irradiated (see col. 21, lines 65-67); and wherein a stop(155; col. 21,lines 50-55) is provide at the exit of the first optical integrator. Tanitsu has an aperture stop having a circular aperture (see col. 21, lines 52-55). Furthermore, in various embodiments, Tanitsu implements the illumination optical system with two inner surface reflection type integrators (for example see FIG. 14), which are square or rectangular (n-gonal); however, Tanitsu fails to specifically disclose one of the two optical integrators in a two-integrator system is an inner-surface reflecting type integrator and the imaging optical system is a zoom optical system as claimed. In the same field of endeavor, Kudo discloses an illumination device suitable for an exposure apparatus for manufacturing a semiconductor chip (col. 1) where the system is constructed to provide a inner surface square shaped reflecting type integrator and fly eye lens integrator in a two integrator system (for example see

FIG. 1). Kudo designs this system to solve the problem of the lens being damage over time from the use of a high out light source, such a laser and provide uniform illumination (see col. 2,lines 1-10). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify, Tanitsu to provide an inner surfaces reflecting square shape type integrator in a dual integrator system, as taught by Kudo, to provide a system which helps to provide even illumination in an exposure (stepper) equal to a system with a plurality of fly eye lens integrators and having simple construction. In addition, Tanitsu and Kudo fail to specifically disclose an embodiment where the image-forming lens is a zoom lens. In the same field of endeavor, the applicants admitted prior art using a two integrator system of a inner-surface reflecting type integrator and fly eye lens incorporates a zoom lens for the image forming system (see FIG. 5, #7; page 3, lines 10-17). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Tanitsu and Kudo to provide a zoom lens as the image forming lens, as taught by applicants admitted prior art, to provide an illumination system which can continuously change the coherence of the light beams. Regarding claim 18, Tanitsu discloses a illumination optical system (col. 1, lines 13-17 and col. 2) used in exposure apparatus for fabrication of semiconductors which illuminates a reticle with a circuit pattern in plane wherein an optical system projects the pattern onto a wafer. Tanitsu discloses several embodiments of the system comprising two integrators, for example FIG. 33, comprising a first integrator (142; fly eye lens); a wave front splitting integrator (162; fly eye lens; col. 21, lines 35-50); an image forming optical system (156,157; col. 21,lines 35-40 and 55-60; col. 6, lines 24-30) for projecting an image of the portion of exit from the first integrator to the wave front splitting type integrator (162; col. 21, lines 50-60); and an irradiating optical system (178,179) for superimposing multiple beams from the wave front splitting integrator (162) on a plane to be irradiated (see col. 21,lines 65-67); and wherein a stop(155; col. 21,lines 50-55) is provide at the exit of the first optical integrator. Tanitsu has an aperture stop having a circular aperture (see col. 21, lines 52-55). Furthermore, in various embodiments, Tanitsu implements the illumination optical system with two inner surface reflection type integrators (for example see FIG. 14), which are square or rectangular

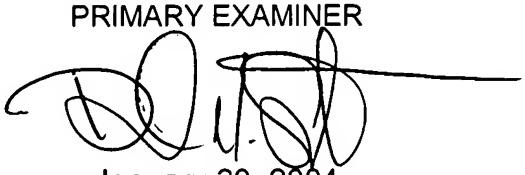
(n-gonal); however, Tanitsu fails to specifically disclose one of the two optical integrators in a two-integrator system is an inner-surface reflecting type integrator and zoom optical system as claimed. In the same field of endeavor, Kudo discloses an illumination device suitable for an exposure apparatus for manufacturing a semiconductor chip (col. 1) where the system is constructed to provide a inner surface square shaped reflecting type integrator and fly eye lens integrator in a two integrator system (for example see FIG. 1). Kudo designs this system to solve the problem of the lens being damage over time from the use of a high out light source, such a laser and provide uniform illumination (see col. 2,lines 1-10). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Tanitsu to provide one of the two optical integrators in a two-integrator system as an inner-surface reflecting type integrator as taught by Kudo, to provide a system which helps to provide even illumination in an exposure (stepper) equal to a system with a plurality of fly eye lens integrators and having simple construction. In addition, Tanitsu and Kudo fail to specifically disclose an embodiment where the image-forming lens is a zoom lens. In the same field of endeavor, the applicants admitted prior art using a two integrator system of a inner-surface reflecting type integrator and fly eye lens incorporates a zoom lens for the image forming system (see FIG. 5, #7; page 3, lines 10-17). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Tanitsu and Kudo to include a zoom lens as the image forming lens, as taught by applicants admitted prior art, to provide an illumination system which can continuously change the coherence of the light beams.

4. This is a Continuation of applicant's earlier Application No. 10/053,191. All claims are drawn to the same invention claimed in the earlier application and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the earlier application. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action in this case. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

5. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no, however, event will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David N. Spector whose telephone number is (571) 272-2338. The examiner can normally be reached at this number Monday through Friday between 6:00 AM and 2:30 PM. In the event that attempts to contact the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Y. Epps can be reached at (571) 272-2328. The fax number for the organization where this application is assigned is (703) 872-9306.

DAVID N. SPECTOR
PRIMARY EXAMINER



January 30, 2004